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The two-hour slitless spectrogram *e* shows the Hα (group) and Hβ as rings in which the Np and Sf quadrants are stronger, as on the direct photographs.

The two-hour spectrogram *f* confirms everything on plate *d*.

FRANCIS G. PEASE.

Plates *a*, *d* and *e* are reproduced in Figure 1 of Plate X.

TWO SUN-SPOTS CLOSE TO THE SUN'S EQUATOR

During the last rotation of the Sun two spots have been present which were very unusual because of their positions close to, but on opposite sides of, the Sun's equator. These groups appeared on the east limb of the Sun in the afternoon of August 12th. The north group, which was then 6° from the equator, was a well developed stream with a large leader. The south group was but 3° from the equator and, judging by its subsequent growth, had been born but a few hours earlier, most likely on August 11th or 12th.

As the Sun's rotation carried the groups across the disk two interesting things happened. The leading spot of the south group grew rapidly, its diameter increasing about 2000 miles per day for ten days. At the same time the leader of the north group, which was already over 30,000 miles in diameter, drifted south at the rate of 4500 miles per day. By August 23rd the edges of both spots had reached the equator, the south one by expansion and the north one by drifting.

During the time from August 13th to August 24th these two groups offered fine examples of the bipolar type. All the spots in the preceding part of the north group, including the large leader, were of the same magnetic polarity as the Earth's south magnetic pole, while the spots in the following half of the group were like the Earth's north magnetic pole. In the south group, just across the equator, the magnetic conditions were exactly reversed.

As the groups approached the west limb the following spots grew smaller, so that when they reappeared at the eastern limb on September 10th it was not surprising to find that the two preceding spots were all that was left of the groups. Their relative positions had not changed during the two weeks in which they were out of sight nor did they change during the following days. By September 15th they began to show signs of breaking up, in a very normal manner, however.

In Plate X, figure 2 reproduces them as they appeared September 13th. The line drawn between them indicates the position of the Sun's equator. The north spot was then 30,000 miles in diameter, the south one 26,000 miles. The distance between their centers was 33,000 miles, leaving a space of but 5000 miles between the edges of their penumbras. The field-strength at the center of the north spot was 3200 gausses and at the center of the south spot 3000 gausses, but of opposite sign.

From the behavior of these spots it would seem as if there must have been some condition which prevented them from crossing the equator, otherwise one would have expected the two spots to drift together instead of the larger drifting toward the smaller. At any rate they illustrate remarkably the difference in polarity of sun-spots on opposite sides of the Sun's equator.

SETH B. NICHOLSON.

NOTE ON A SENSITIVE SPECTROGRAPHIC ARRANGEMENT

The great light-gathering power of the 100-inch telescope, the freedom from chromatic aberration, the long focal length, and the consequent slow convergence of light at the secondary focus, make it possible to develop a simple and effective device for obtaining the spectral types and absolute magnitudes of extremely faint stars in crowded regions (such as globular or open clusters), as well as of faint isolated objects in general. The faintness to which our greatest instruments can carry spectroscopic researches is definitely limited so long as we demand sufficient dispersion and definition to permit extended analyses of lines in stellar spectra or desire to use spectroscopes largely for accurate determinations of radial velocity. This working limit can be considerably extended if we sacrifice dispersion and accuracy in radial velocity measures; and, if we are willing to forego altogether the velocities (uncertainly determined with one of these small-dispersion spectroscopes) and to aim at the derivation of spectral types alone, we may do away with the slit, which is generally very wasteful of light, and lower still farther the magnitude limit.

Recent experiment at the secondary focus of the 100-inch reflector with an especially rapid, slitless, focal-plane spectroscope gives in a five-minute exposure the spectral type of twelfth magnitude stars. In clusters, as many as thirty stars were photographed at one time, but the scale is reduced to one-sixth the original at